The forty-five cases of malaria definitely identified at the Hammond General Hospital represented almost 10 per cent of the patients admitted from the South Sea area, but it must be remembered that this incidence is abnormally high because nineteen of the infected patients were evacuated to the United States primarily because of their infection. In a group of 253 patients from the South Sea area who were free from symptoms of malaria, blood smears for malaria parasites were negative in all but two instances, giving an incidence of infection of only 0.79 per cent. Further observation of this group of patients will probably show an increase in the incidence of plasmodia infection.

The majority of the patients received on the malaria ward had been repeatedly incapacitated for military duty by chills and fever before being evacuated from the South Seas. Several had had five to ten separate bouts of pyrexia, for which they had been treated before arrival in California. Many stated that they would frequently develop chills and fever while taking suppressive atabrine therapy.

These patients with malaria are a selected group in whom a lack of resistance to plasmodial infection had already been demonstrated overseas, and was often the cause of their return to this continent. Consequently, the high incidence of relapses in this group is not indicative of the incidence of relapses in South Sea malaria in general. Nevertheless, this small group of patients vividly demonstrates the difficulties of curing imported malaria in the United States by the mode of treatment outlined, and presents a problem as yet unsolved in the proper disposition of these patients. A more satisfactory result might have been obtained by using larger doses of atabrine over a long period of time.†

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FRACTURES OF THE TIBIAL CONDYLES*

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IN any discussion of fractures of the tibial condyles some attention should be given to the anatomy of the knee joint.

The knee joint is the largest and one of the strongest joints in the body—the latter fact shown by the rarity of knee-joint dislocations. The great strength and stability of the knee joint are not due to the conformation or unusual strength of the bony structures entering into the formation of the joint, but are due to the strength and multiplicity of the ligaments within and without the joint, and also to the muscle attachments about the joint. As a matter of fact, the upper expanded portion of the tibia overhangs the shaft on either side, and its lateral margins are poorly supported from below; consequently, the junction of the shaft, with the expanded cancellous tuberosities, is a point of definite weakness, and as a result fractures are fairly common.

Briefly, the structures stabilizing the knee joint are divided into the extra-articular and the intra-articular ligaments. The extra-articular ligaments are made up of the capsule, deficient at various points, but strengthened by special bands and by fibrous expansions from various tendons and muscles.

On the femur the capsule arises in front from just above the articular surfaces, fusing with the periosteum; on either side from the condyles as high as the level of the lateral tuberosities, and posteriorly is attached to the femur about one centimeter above the highest point reached by the articulating cartilage. Running anteriorly the capsule is attached to the edges of the patella just anterior to its articulating surface, and inferiorly is attached to the tibia all around its roughened circumference, a little below its top, and to the periphery of the semilunar cartilages.

Anteriorly, the ligamentum patellae run from the apex of the patella to the anterior tibial tuberosity, while on each side of the patella and the ligamentum patellae expansions from the vasti and fascia lata form well-defined and stabilizing structures, called the patellar collateral ligaments.

On either side of the joint the tibial and fibular collateral ligaments are well-defined and powerful structures, which limit side motions of the joint and serve as check ligaments to hyperextension. The external lateral ligament is especially well defined and splits the tendon of the biceps at its attachment to the head of the fibula.

Posteriorly, the capsule is reinforced by the oblique popliteal ligament (ligament of Winslow or posterior transverse ligament), which passes obliquely from the tendon of the semi-membranous across the joint, merging with the capsule and fibers from the external head of the gastrocnemius.

The intra-articular structures are the *cruciate ligaments,* the *medial* and *lateral menisci,* the *coronary ligaments* attaching the periphery of the menisci to the non-articular edge of the tibia, and the *transverse ligament* running between the anterior convex margins of the menisci. The crucial ligaments are the strongest ligaments of the knee joint, and limit forward and backward motion at the joint.

In recapitulation, we can understand what a truly important part the knee-joint ligaments play in not only tending to minimize displacement of tibial tuberosity fractures, but by their intimate attachment to the femur above and the tibia below, tend to hold the displaced tuberosity fractures in position after maximum reduction has been effected. Furthermore, by their firm attachment to the upper portion of the tibia it is believed that they also have a certain amount of moulding effect upon the newly-forming callus, provided that early active motion is started.

FRACTURE TYPES

Tibial condylar fractures may occur as a result of direct or indirect violence.

The indirect types occur by falling upon the feet with the leg in extension, or by forcible abduction

† Subsequent studies of blood atabrine concentrations tend to substantiate this statement.

* From the office of the Chief Surgeon of the medical department of the Pacific Electric Railway.
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or adduction at the knee with the leg fixed, resulting in fracture either of the lateral or medial tuberosity.

Fractures due to direct violence result from severe blows or crushing injuries in the region of the knee just below the joint. A common cause is the so-called "bumper fracture" usually due to a blow being delivered to the outer surface of the leg below the knee, driving the lateral tibial tuberosity forcibly against the lateral femoral condyle. All types of fractures may be noted, from uncomplicated simple linear fractures without displacement, to those with complete shearing off of one or both tuberosities, and depression and impaction of the separated fragment to a variable degree. In the more aggravated type of fracture it would seem that there must be some disruption of the important joint ligaments, especially the crucial and the collateral ligaments. We have seen cases in which the joint seemed to have been pulpified, with undue mobility in all directions, but which, to our utter amazement, healed with a good functioning joint.

In nearly all tuberosity fractures the joint surfaces are involved, with malalignment of the horizontal plane of the tibial plateau. Fortunately, however, in the great majority of cases, with adequate reduction, the persisting slight irregularity of the tibial articulating surfaces does not seem to seriously compromise a good functional result. Frequently, the fibula, just below the head, is broken, in conjunction with lateral tuberosity fracture, and usually, as a result, the downward and lateral displacement is more marked.

DIAGNOSIS

X-rays are the only means of making an exact diagnosis in these fractures, and determine in large measure the treatment to be given. The clinical symptoms are important, but only in so far as they indicate trauma of variable degree to a knee joint.

TREATMENT

Usually the knee joint is distended, sometimes markedly so, with bloody effusion, and it is good practice to aspirate the joint one or more times if the joint is tense. Following aspiration, the leg is placed upon a pillow in a slightly flexed position, with ice bags surrounding the knee joint. Long sand bags are placed on either side of the leg. Soft tissue injuries are appropriately treated, and with adequate sedation the patient will be comfortable until decision as to further treatment is made. Usually it is better to wait until the joint effusion and soft tissue injury subside before doing final reduction. Should the case be one of a linear fracture without separation and displacement of the tuberosity, nothing futher than simple immobilization upon pillows, protected by sand bags, is, in our experience, necessary. The patient, for a few days, should not be encouraged to move the joint, but just as soon as pain and spasm subside the patient should be instructed to extend and flex the leg a few degrees, short of causing pain. Under no circumstances should the leg be forcibly extended or flexed, since the ensuing pain and spasm will do harm.

By not immobilizing the knee, in the simple uncomplicated fracture, muscle tone is preserved, especially of the quadriceps extensor group, and the capsule and its collateral ligaments are not stiffened by the attendant disuse. Weight bearing is not permitted until the fracture lines are obliterated.

The fact that the fracture may involve the joint surface is in itself not an indication for immobilization in a cast or other form of apparatus, and certainly a cast with a walking heel should never be used in these cases. We must bear in mind that the capsule, with its collateral ligaments and the cruciate ligaments, tend to, and probably do retain the fractured surfaces in apposition.

Treatment of tibial plateau fractures, with displacement or impaction, calls for quite a different form of treatment.

Traction, manipulation, open operation and other forms of treatment all fail, in greater or less degree, in the majority of cases, of accomplishing the ultimate desideratum of all fracture treatment—that is, adequate reduction.

The method we use is a modification of Forrester technique: Under anesthesia, preferably spinal, a large carpenter's "C" clamp is applied so that the flat surface on the end of the screw bolt is applied to the displaced and separated fragment. The opposite end is applied over a smooth 1 x 3 x 6-inch board, the latter providing a broad surface for counterpressure. If the displacement is downward as well as lateralward, the direction of the clamp is oblique so as to exercise pressure in an upward as well as transverse direction. Both the board and the compressing surface of the screw bolt are well padded. Firm pressure is exerted; and when sufficient force has been applied, the clamp is removed and x-rays taken in both lateral and anteroposterior directions. If satisfactory reduction has been obtained, as proved by x-ray study, the leg is maintained in extension, and a cast, from the toes to the groin, is applied, taking precautions to have sufficient padding, and especially over the fibular head, on account of possible injury to the peroneal nerve as it winds around the neck of the fibula. After two or three layers of plaster have been applied, the Forrester special knee splints are incorporated in the cast on either side so that the hinged part of the splints is exactly opposite the condyles of the femur and secured in place by additional plaster bandaging.

The splint consists of two pieces of strap iron about 16 to 20 inches long, hinged at their middle. A curved threaded rod runs from the upper strap above the joint and passes through a ring on the lower strap. Two nuts, one above and one below the ring on the distal strap, regulate the degree of motion of either splint. The leg may be maintained in complete extension or slight flexion; or by simply turning the nuts any degree of flexion may be carried out. Before the plaster hardens, a circular section is removed from the cast about the knee,

so as to completely expose the front, back and sides of the knee sufficiently to allow full freedom of motion. After 48 to 72 hours the nuts may be unlocked and the patient allowed to move the knee, increasing the amount of motion by degrees consistent with the patient's freedom from pain and spasm.

RECAPITULATION

Efficient reduction by "C" clamp, under anesthesia.

Cast from toes to well above the knee, with circular section surrounding the knee cut out while cast is still soft, with incorporation of Forrester hinged splint into cast.

Early Motion.—Any time after the cast hardens, active motion may be started, provided no pain is caused. Never force motion, either with or without anesthetic.

Weight Bearing Late in Treatment.—Never before six to eight weeks—and then with the leg protected by long caliper brace, to be worn four to six months. We must remember that early in the treatment of many of these cases there is a tendency toward lateral instability of the knee. If weight bearing is started too early, and if started without the protection of a caliper brace, the instability may become permanent.

Those who advise operative reduction usually advise taking out at the same time the involved semilunar cartilage and doing other repair work of the apparently injured joint ligaments. In my opinion, it is better to wait until maximum restoration of function has been obtained, because many of those cases, even with ligament disruption, go on to a remarkably good recovery of the joint.

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CLINICAL NOTES AND CASE REPORTS

THROMBOCYTOPENIC PURPURA: A CASE CAUSED BY SULFADIAZINE*

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THERE have been two previous reports of thrombocytopenic purpura developing from the use of sulfadiazine. We wish to report the third such instance.

REPORT OF CASE

A seven-year-old boy became ill with chickenpox, and subsequently developed impetiginous lesions. The family doctor prescribed sulfathiazole ointment for local application and sulfadiazine to be taken orally as follows: 1½ grams initially, to be followed by ¾ grams every six hours.

After 4½ grams had been given in one and a half days, the mother noticed "brown spots" behind the boy's knees and on the buttocks. After 7½ grams in two and a half days the urine became bloody, and after 9 grams in three days the hematuria became so pronounced that the physician was called and the child was hospitalized.

Family history revealed that the mother had asthma.

Past history was also significant, in that the patient had asthma. There was no history of bruising easily or of a previous similar episode.

Physical findings showed a seriously ill white boy with a rectal temperature of 102 degrees Fahrenheit, pulse 140, and respirations of 25 a minute. There were purpuric spots over the entire body. A large, tender, cystic swelling occupied the back of the neck and there were enlarged tender cervical glands bilaterally. The mouth contained bloody saliva, and the mucosa of the mouth and throat was covered with purpuric spots. The chest findings were not remarkable. The abdomen revealed peri-umbilical tenderness, but no palpable masses or organs.

The admission diagnosis was thrombocytopenic purpura, due to sulfadiazine, impetigo in a nearly healed condition, and possible carbuncle of the neck.

Laboratory data, the day following admission, were as follows: Hemoglobin 23 per cent with 1,430,000 red blood cells; platelets, 20,000; white blood cells, 23,850 with 86 per cent segmented neutrophiles; 2 per cent staph forms; and 12 lymphocytes. The bleeding time was over forty-five minutes, and the clotting time six minutes, with very little retraction after eighteen hours. The Rumple Leede test was markedly positive, the prothrombin time 76 per cent of normal; the urine was grossly bloody, containing 300 plus red blood cells per high-power field, and did not show sulfa crystals.

By the next day the hemoglobin had dropped to 16 per cent and the patient appeared moribund, although he had received two 250 c.c. transfusions of whole bank blood. During the next four days the patient received 1,500 c.c. of whole fresh blood given in 300 c.c. units. Following this the hemoglobin reached 78 per cent and the bleeding time was six minutes although the platelet count was only 42,000; the urine showed only 1-2 red blood cells per high power field.

Two weeks after admission the bleeding time was one and a half minutes, the platelet count 139,000, the hemoglobin 89 per cent, and the urine negative. The patient was discharged as markedly improved nineteen days after admission.

DISCUSSION

The two previously reported instances of thrombocytopenic purpura due to sulfadiazine terminated fatally and were as follows: One, a patient of seventy-nine years with pneumonia, who had received 33 grams over a period of eleven days when purpura was first noticed [1]; the other, a patient of sixty years—with a wound infection following nailing of a fractured hip—who had received 25 grams of sulfadiazine in six days when the purpura developed.[2] This emphasizes once more the need for careful observation and frequent blood and urine studies in all instances of sulfonamide medication.

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* From the Highland-Alameda County Hospital, Oakland.

Thyroid, to tolerance, taken regularly over a prolonged period, is effective in correcting premenstrual distress in a high percentage of cases. Premenstrual headache and nervousness are the most responsive to the treatment.—Hudgins.